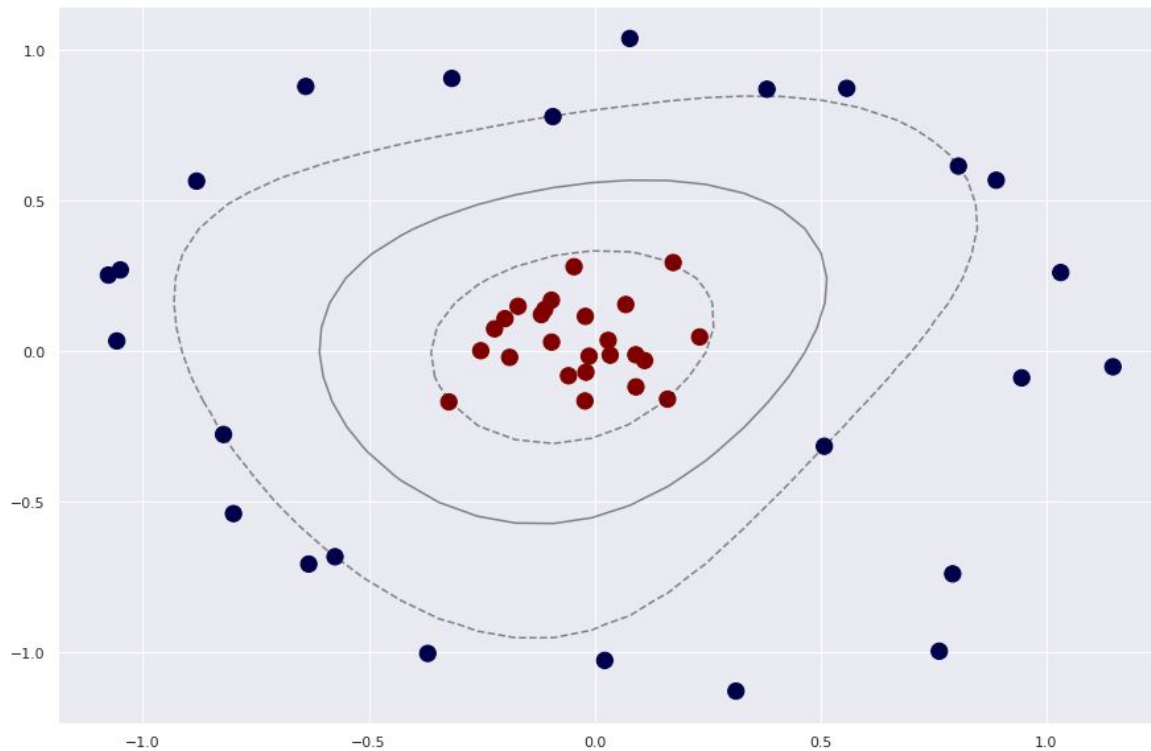
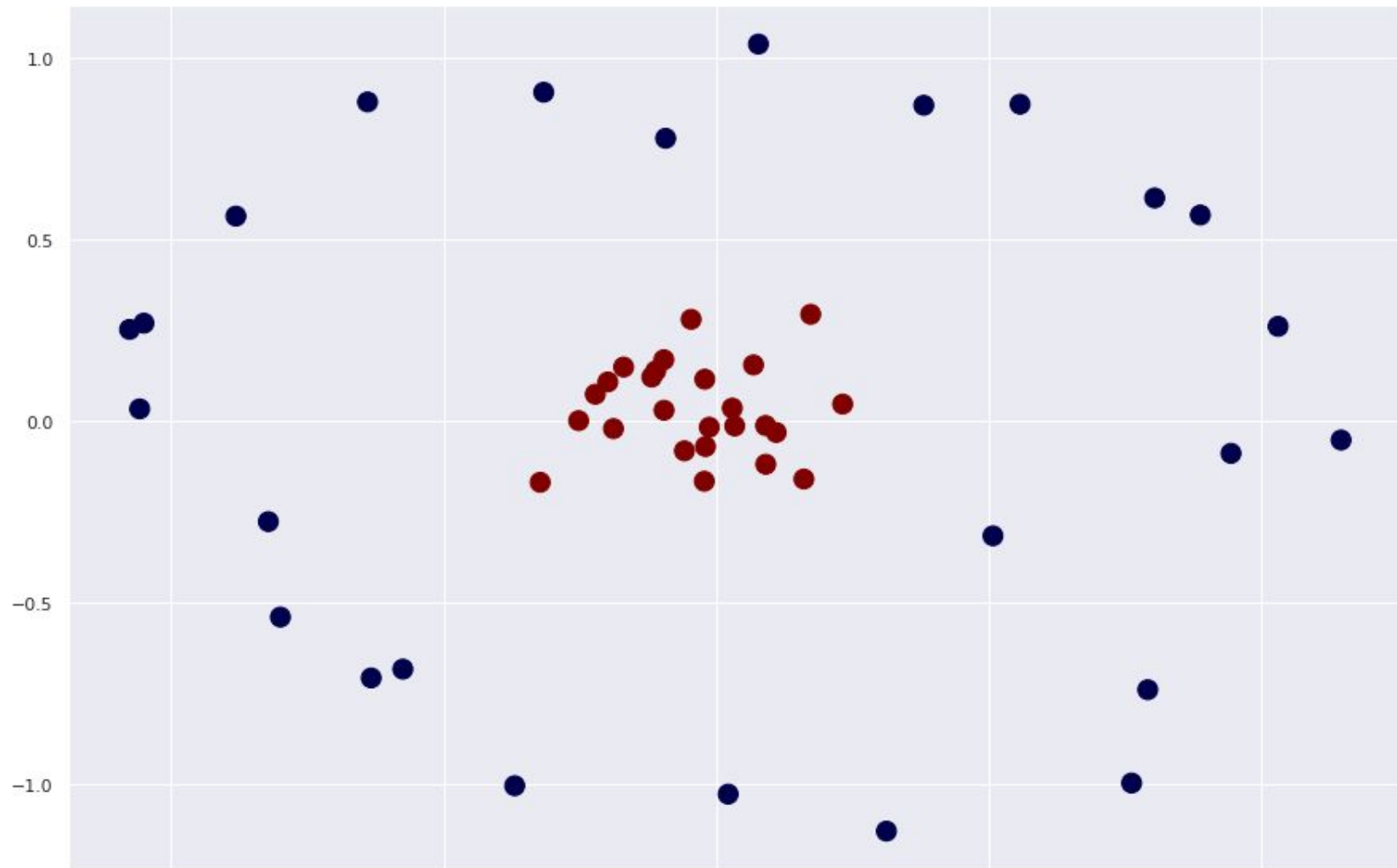
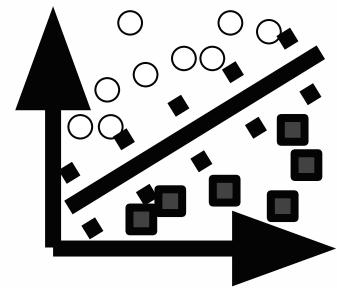


SVM on Non-Linear Data

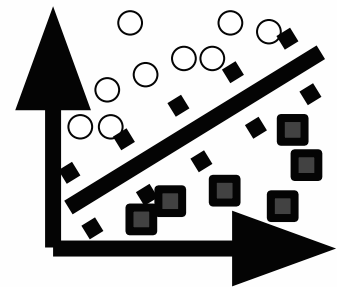






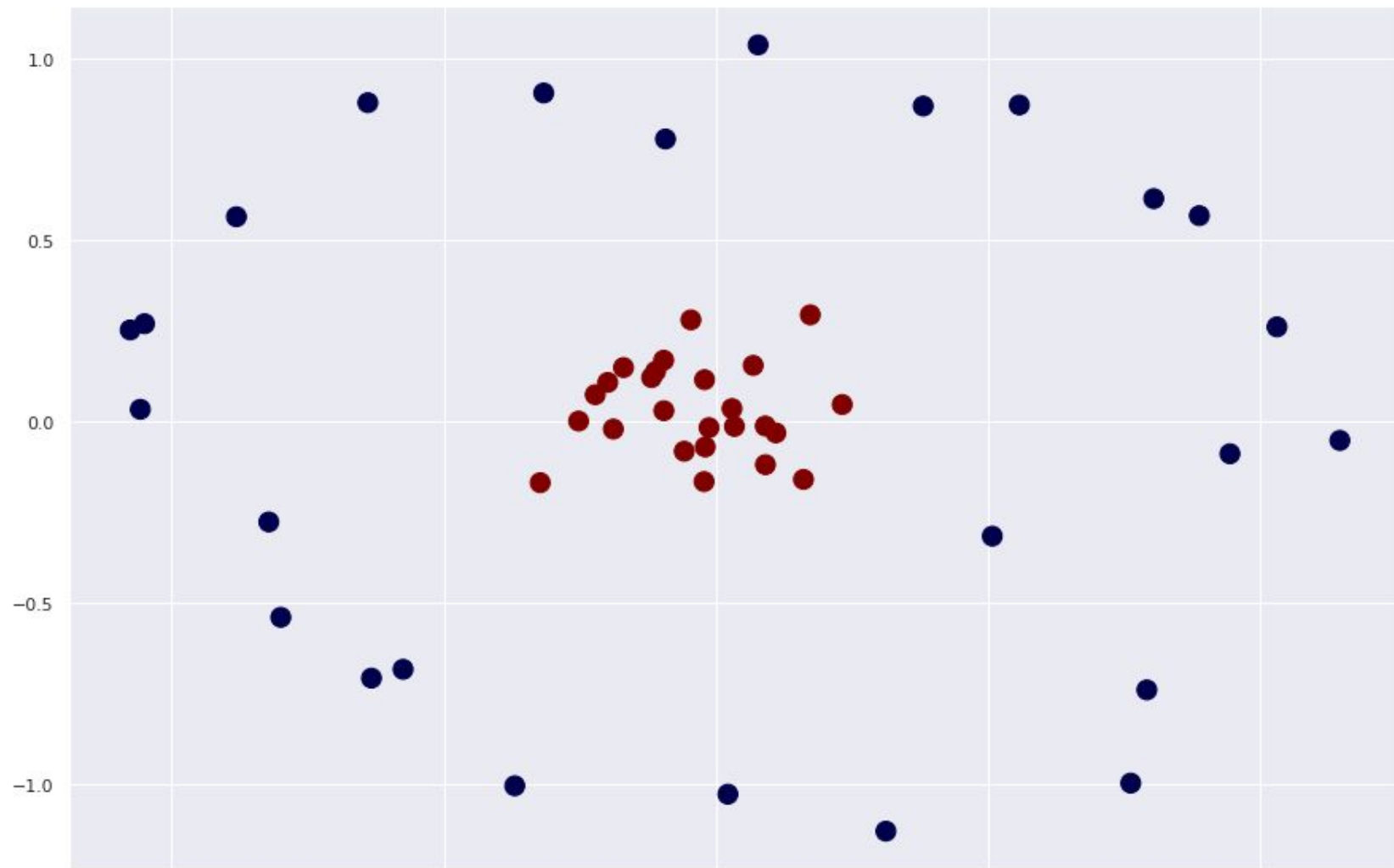
SVM becomes *powerful* when
combined with **kernels**

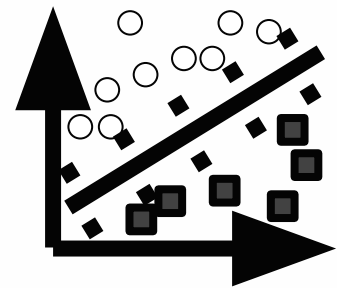
- Kernels project data into higher-dimensional space.



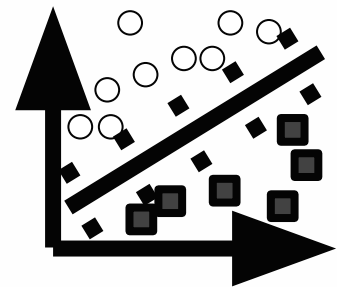
Why do we need to do that?

- To classify data that you can't separate linearly



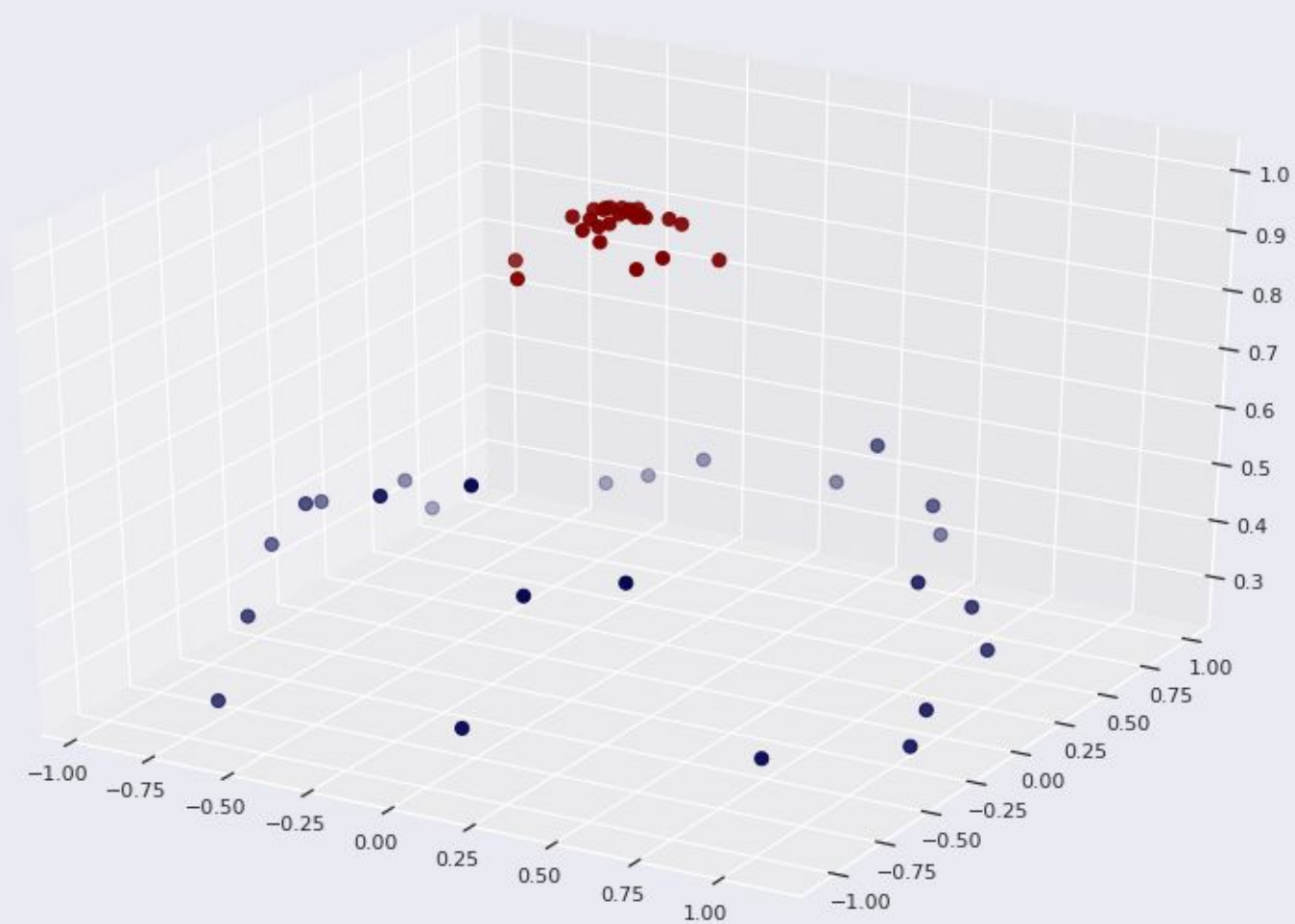


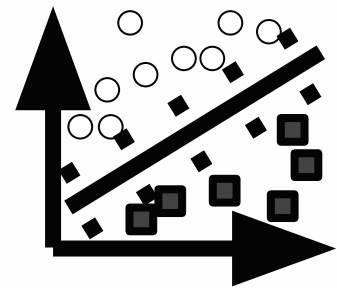
- We **can't classify** the dataset with a linear decision boundary
- Can **convert** dataset to a linear dataset using **higher dimensions**.



Add a **Z dimension** to the dataset with an equation.

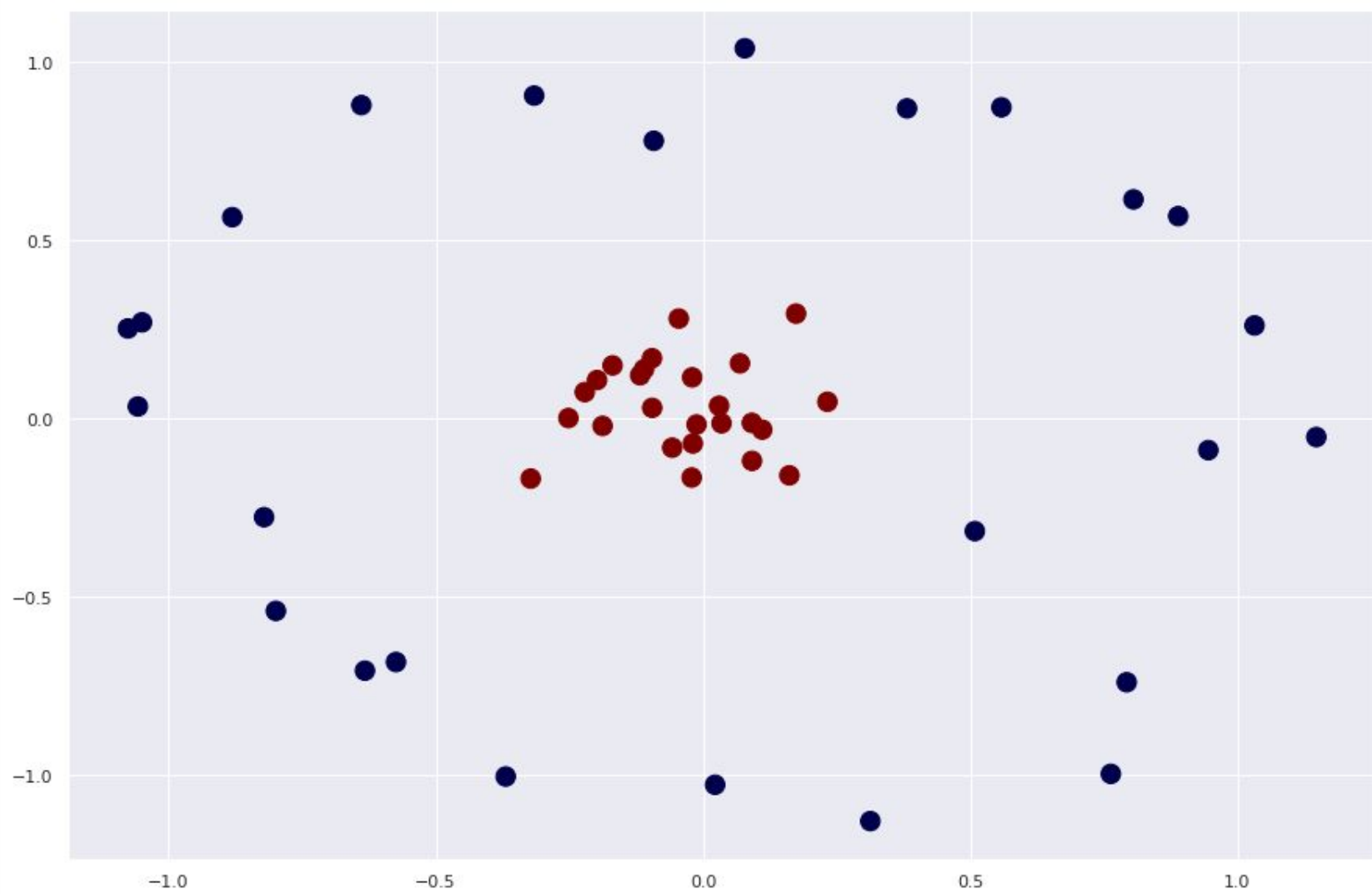
- Example:
 - radial basis equation centered around the middle clump
 - $\text{np.exp}(-(X^{**2}).\text{sum}(1))$

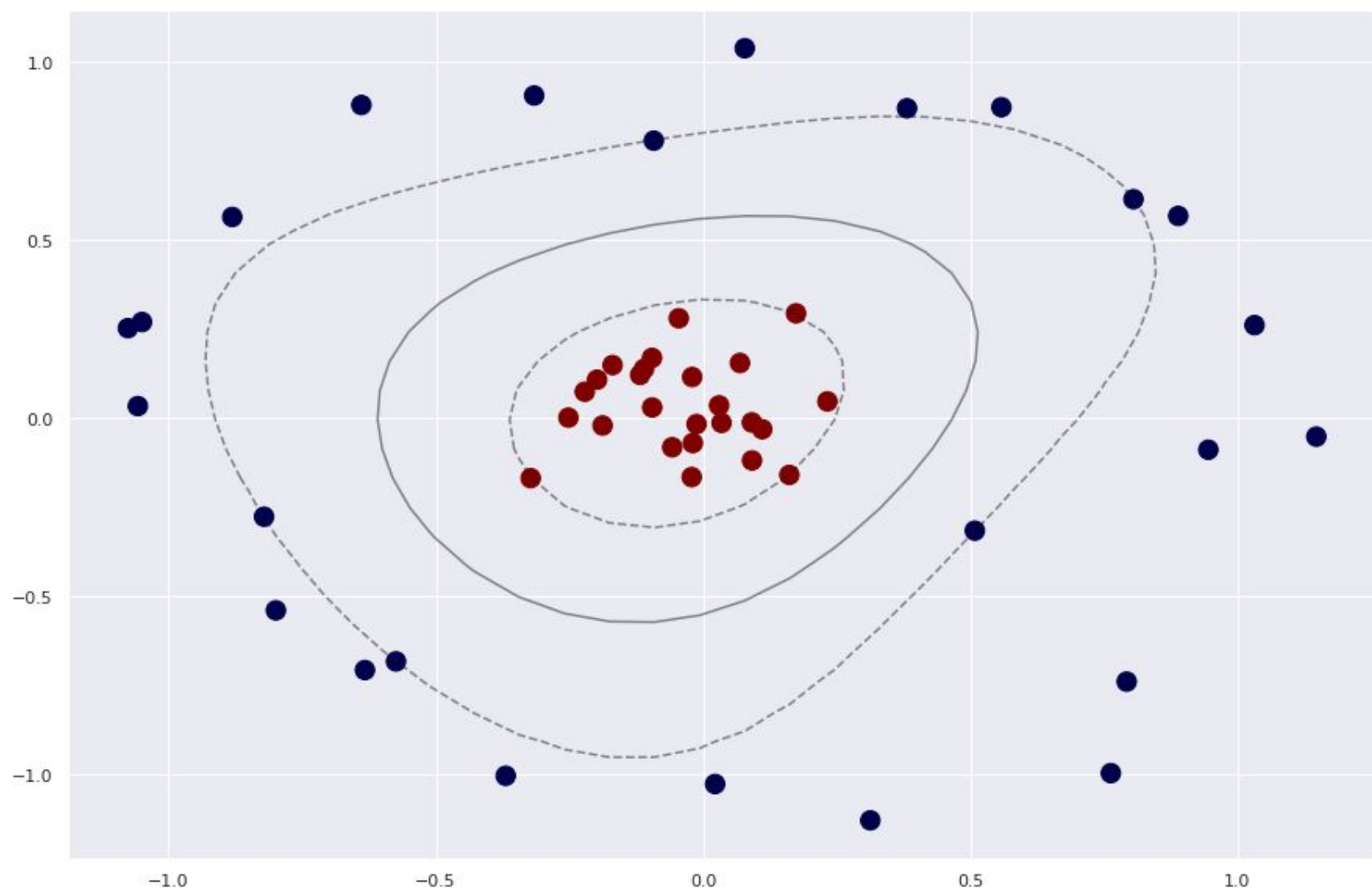




What is a hyperplane?

- separates the space into two half spaces.
- one dimension less than its ambient space.
 - eg) 2D hyperplane for a 3D space

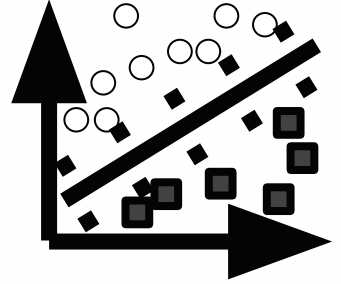




Do we have to make a hyperplane from scratch?

- No

SVM uses a kernel to make the hyperplane.



SVM on Non-Linear Data ✓

